Form ESA-B4. Summary Report for ESA-240-3
Public Report – Final

Company	Weyerhaeuser New Bern Cellulose Fibers	**ESA Dates**	December 2-4, 2008
Plant	Vanceboro, NC	**ESA Type**	Paper Machines
Product	Fluff Pulp	**ESA Specialist**	Dick Reese

Brief Narrative Summary Report for the Energy Savings Assessment:

Introduction:

Dick Reese of Dick Reese and Associates, Inc. conducted a pulp dryer energy evaluation at Weyerhaeuser New Bern Cellulose Fibers in Vanceboro, North Carolina December 2 to 4, 2008. The evaluation was sponsored by the United States Department of Energy (DOE) Save Energy Now initiative.

Steam is generated by burning black liquor and purchased #6 fuel oil. No. 6 fuel oil is currently the incremental fuel. A natural gas line is being installed and natural gas will soon be available to the mill.

Total annual electricity consumption is 497,640 MW. Purchased electricity is 20% of total consumption.

Estimated annual energy cost savings for recommended projects is shown in Table 1 above.

Objective of ESA:

The objective of the assessment was to identify opportunities to reduce energy consumption on the fluff pulp machine.

Focus of Assessment:

The evaluation was focused on energy reduction projects that could be implemented with no capital cost or would have a payback period of less than two years.

Approach for ESA:

Paper machine energy scorecards were completed and discussed with mill personnel for the pulp machine to identify energy strengths, limitations, and opportunities to reduce energy consumption. Walking tours of the machine were made to identify other opportunities for reducing energy consumption. An exit meeting was held to discuss scorecard results, energy performance indices, and opportunities to reduce energy consumption.

General Observations of Potential Opportunities:

a. Near term opportunities include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
b. Medium term opportunities require purchase of additional equipment and/or changes in the system such as installation of heat recovery equipment or equipment to permit reduction. It would be necessary to carryout further engineering and return on investment analysis.
c. Long term opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

1. Shut off steam to steam showers when not drying limited-Steam use at steam showers is less efficient than using steam to evaporate water in the dryer. Estimated 55 psig steam use on steam showers is currently 20,000 lb/hr. The savings estimate assumes that the steam showers can be turned off 50 days per year. Shutting off the Great Profiler steam box on the fourdrinier may make the sheet wetter at the open draw after the couch roll. Wet web strength goes down approximately 7% for each one percentage point reduction in sheet dryness.
2. Optimize steam showers when drying limited-Heat transfer efficiency of the steam ejectors installed at the couch roll and ahead of the first is likely low. Trials should be conducted to document optimum steam flow for energy efficiency. The benefit calculation assumes that 5,000 lb/hr of steam can be saved when the machine is drying limited (300 days per year).
3. Lower differential pressure on predryers-The six predryers dryers between the second and third presses are currently operated at 9 lb differential pressure with Johnson rotary syphons. Estimated blow through steam flow for each dryer is 675 lb per hour of steam. Differential pressures are very high for operating speeds. Reducing differential pressure to 4 psi would be sufficient to evacuate condensate from the dryers and would reduce blow through steam flow per dryer to 275 lb per hour. This would provide annual steam savings of $286,000. Mill personnel should check to make sure differential pressure transmitters are connected and calibrated properly before changing differential pressures.
4. Conduct trials with lower or zero pressure in the predryers-There has long been debates about whether predryers between second and third presses provide any benefits. The hypothesis was that predryers would heat the sheet and increase dewatering at the last press due to lower viscosity of water in the sheet. Temperature measurements taken by Wells Enterprises on the New Bern dryer indicate that sheet temperature is approximately the same before and after the dryers. Trials should be conducted by gradually lowering steam pressures while monitoring sheet drying. Alternately, it may be possible to shut some dryers completely off. If dryers are shut off, steam and condensate lines should be removed so they do not fill with condensate. Estimated condensing rate is 1,350 lb per hour for each dryer. If condensing rates could be reduced by 50%, annual savings would be $483,000. Steam use in the predryers can definitely be reduced when the machine is not drying limited to reduce overall steam consumption.
5. If it is necessary to operate some or all predryers, install scoop syphons that can operate with zero differential pressure-Scoop syphons would reduce blow through steam flow to 25 pounds per hour per dryer. Scoop dryers are ideal for predryer applications. No differential pressure is required and only a condensate bleed is needed. A small tank would have to be installed to separate condensate from bleed steam before it is returned to the low pressure collection tank. Installation of scoop syphons would provide annual savings of $180,000 compared to operating the existing syphons at 4 lb differential pressure. Cost of scoop syphons would be approximately $2,000 per dryer.
6. Conduct trials with lower whitewater temperature-Current average whitewater temperature is 143^{o}F. Whitewater temperature is controlled by adding steam to whitewater sent to the pulp dryer in the bleach plant. Some mills have found that operating with whitewater temperature over 140^{o}F does not increase fourdrinier drainage and is not cost effective. The bleach plant currently sends approximately 1,000 gpm of warm water to the pulp dryer. Annual steam savings will be approximately $60,000 for each Fahrenheit degree that whitewater temperature can be reduced. It should be possible to operate at temperatures well below 140^{o}F when the pulp dryer is not drying limited. The benefit calculation assumes that average whitewater temperature can be reduced by five Fahrenheit degrees.
7. Recover heat from paper mill effluent- The difference in average annual temperatures between incoming water to the paper mill and effluent is 43^{o} F. This indicates that approximately $1.2 million worth of heat is lost with effluent from the pulp dryer. Installation of a heat exchanger to transfer heat from the effluent to incoming fresh water could recover 50% of the heat lost. Pre-heating fresh water may cause some issues with vacuum pump seal water temperature and other cooling water flows so cooling water requirements need to be considered. There may also be opportunities to recover heat from pulp mill effluent.
8. Develop balances of pulp dryer water systems to help identify opportunities to reuse water- Water balances need to be developed to identify opportunities to use clarified whitewater on pulp dryer showers. Installation of filtration equipment such as gravity strainers and canister filters may permit greater use of clarified whitewater. Water consumption in the pulp mill appears high and there are likely opportunities to reduce water use there.

9. Shut off one couch pit agitator when the sheet is on the reel-There are two agitators on the couch pit each with 40 connected horsepower. Fourdrinier trim falls in the couch pit when the sheet is on the reel. Operation with one agitator will be adequate to defiber trim. Agitator operation should be tied into a break detector so both agitators are on when the full sheet goes in the couch pit. There are some plugging issues with couch pit discharge piping and these problems need to be resolved before one agitator is shut off. Benefits were estimated based on the agitator drive motors operating at 40% of full load when the sheet is on the reel.

Management Support and Comments:

Mill personnel expressed satisfaction at the exit meeting for the evaluation and the recommendations to reduce energy consumption.

DOE Contact at Plant/Company:

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